

CLAIMS

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1. A radiation detector in which primary electrons are released into a gas by ionizing radiation from a radiation source (10) and are caused to drift to read-out electrodes (1) by means of an electric field (2) generated by applying a negative tension to a drifting electrode (11) located near the radiation source (10), said radiation detector comprising
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- a matrix of electric field condensing areas, each of said condensing areas producing a local electric field gradient sufficient to generate in said gas an electron avalanche from one of said primary electrons so that said gas electron multiplier operates as an
 - 530 amplifier for said primary electrons, and
 - a position-sensitive signal detector comprising read-out electrodes (1) to which is applied a tension which is positive relatively to the drifting electrode (11),
- 535 characterized in that said matrix of electric field condensing areas and said signal detector are united in a same dual-purpose physical structure (3).

2. The radiation detector of claim 1, characterized in
540 that said dual-purpose physical structure (3) comprises

- a first set of longitudinal electrodes (1) disposed parallel to each other to form a first plane (4) closest to the radiation source (10), said first plane
545 being substantially perpendicular to said electric field (2) and
- at least one additional set of longitudinal electrodes (1) disposed parallel to each other to form at least one additional plane (4'), said additional plane or
550 planes being superposed and parallel to said first plane (4),

wherein the direction of the longitudinal electrodes (1) in each of said planes forms an angle with the direction
555 of the longitudinal electrodes (1) in each of the other plane or planes, each crossing of said longitudinal electrodes in their respective planes producing a local electric field gradient, and

560 wherein the longitudinal electrodes (1) in the respective planes are applied progressively positive tensions relatively to the drifting electrode (11) when going from the plane (4) closest to the drifting electrode to the

plane farthest from the drifting electrode, said plane
565 farthest from the drifting electrode being applied a
positive tension.

3. The radiation detector of claim 2, characterized in
that said dual-purpose structure (3) comprises two sets
570 of longitudinal electrodes (1) forming two superposed
planes (4) and (4'), and in that, when viewed from above,
the direction of the longitudinal electrodes (1) in the
first plane (4) is perpendicular to the direction of the
longitudinal electrodes (1) in the second plane (4').

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4. The radiation detector of claim 2, characterized in
that said dual-purpose structure (3) comprises three sets
of longitudinal electrodes (1) forming three superposed
planes (4), (4') and (4''), in that the direction of the
580 longitudinal electrodes (1) in each plane forms an angle
of 60 degrees with the direction of the longitudinal
electrodes (1) in each of the other planes, and in that,
when viewed from above, the longitudinal electrodes (1)
in a given plane cross the longitudinal electrodes (1) in
585 the two other planes at the same points (5) where the
longitudinal electrodes (1) in these two other planes
cross.

5. The radiation detector of any of claims 2 to 4,
590 characterized in that the longitudinal electrodes (1)
disposed parallel to each other forming said planes are
conductive strips (6).

6. The radiation detector of claim 5, characterized in
595 that said planes are spaced by spacers (7) located at the
crossing points (5) of said conductive strips.

7. The radiation detector of claim 6, characterized in
that said spacers (7) are made of polyimide.

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8. The radiation detector of claim 6, characterized in
that said spacers (7) are made of glue.

9. The radiation detector of any of claims 2 to 4,
605 characterized in that the parallel longitudinal
electrodes (1) disposed parallel to each other forming
said planes are conductive wires (8).

10. The radiation detector of claim 9, characterized in
610 that said conductive wires (8) are woven with non-
conductive wires (9) to form a mesh, said conductive
wires being oriented according to a first axis and said
non-conductive wires being oriented according to a second

axis, said second axis being perpendicular to the first
615 axis.

11. The radiation detector of claim 10, characterized in
that said conductive wires (8) are individually
alternated with non-conductive wires (9) in said first
620 axis.

12. The radiation detector of any of claims 2 to 11,
characterized in that the longitudinal electrodes (1) in
said dual-purpose structure (3) are made of Tungsten.

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13. The radiation detector of any of claims 1 to 12,
characterized in that said dual-purpose physical
structure (3) is mechanically flexible.

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